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2 1. A method for monitoring, measuring and capturing transactions in a  
3 communication network experienced by a user of a communication device  
4 operating in the communication network, said method comprising:

5 monitoring a plurality of transactions occurring between a user of a  
6 communication device operating in a communication network and the  
7 communication network in accordance with a functional definition of a probe  
8 element of the communication device, wherein the plurality of transactions are  
9 at least a portion of the user's interaction with the communication network via  
10 the communication device and wherein the functional definition of the probe  
11 element is operable to be dynamically and remotely configured by the  
12 communication network via a communication link between the communication  
13 device and the communication network;

14 capturing the plurality of transactions in accordance with the functional  
15 definition of the probe element; and

16 measuring one or more characteristics of the plurality of transactions to  
17 generate user interaction data in accordance with the functional definition of  
18 the probe element.

19

20 2. The method of claim 1, further comprising prior to said monitoring:

21 defining the functional definition of the probe element in accordance  
22 with the type of user interaction data desired to be generated for the  
23 communication device.

24

25 3. The method of claim 2, further comprising:

26 downloading the probe element to the communication device from the  
27 communication network via the communication link.

28

29 4. The method of claim 1, further comprising:

- 1 4. The method of claim 1, further comprising:  
2 transmitting the user interaction data to the communication network in  
3 response to at least one of the functional definition of the probe element and a  
4 request from the communication network.  
5
- 6 5. The method of claim 1, further comprising prior to said monitoring:  
7 downloading the probe element from the communication network via  
8 the communication link.  
9
- 10 6. The method of claim 1, wherein the communication device operates in  
11 a non-interactive mode of operation in which the user interaction data is  
12 generated in a manner that is transparent to the user of the communication  
13 device.  
14
- 15 7. The method of claim 1, further comprising:  
16 a network operator of the communication network dynamically  
17 controlling operation of the communication device in a diagnostic mode of  
18 operation in accordance with a diagnostic criterion.  
19
- 20 8. The method of claim 7, further comprising:  
21 the network operator controlling the communication device to perform  
22 diagnostic tests of one or more network performance problems capable of  
23 being monitored by the communication device in accordance with the  
24 diagnostic criterion.  
25
- 26 9. The method of claim 7, further comprising:  
27 when not in the diagnostic mode of operation the communication  
28 device operating in a non-interactive mode of operation during which the  
29 plurality of transactions are monitored and captured and the user interaction

1 data is generated in a manner that is transparent to the user of the  
2 communication device.

3

4 10. The method of claim 7, further comprising:

5 when not in the diagnostic mode of operation the communication  
6 device operating in a quasi-interactive mode of operation during which the  
7 plurality of transactions are monitored and captured and the one or more  
8 characteristics of the plurality of transactions are monitored by the probe  
9 element to generate the user interaction data and during which the user can  
10 decide when to report to the network operator one or more network  
11 performance problems identified in the user interaction data.

12

13 11. The method of claim 7, further comprising:

14 the user of the communication device granting permission to the  
15 network operator to control the communication device to perform diagnostic  
16 tests while in the diagnostic mode of operation.

17

18 12. The method of claim 7, further comprising:

19 downloading the diagnostic criterion from the communication network  
20 to the probe element via the communication link.

21

22 13. The method of claim 12, wherein the communication link comprises the  
23 Internet.

24

25 14. The method of claim 1, further comprising:

26 the communication device operating in a quasi-interactive mode of  
27 operation during which the plurality of transactions are monitored and  
28 captured and the one or more characteristics of the plurality of transactions  
29 are measured by the probe element to generate the user interaction data and

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1 during which the user can decide when to report to the network operator one  
2 or more network performance problems identified in the user interaction data.

3

4 15. The method of claim 14, further comprising:  
5 the user of the communication device previously deciding that the  
6 communication device will operate in the quasi-interactive mode of operation.

7

8 16. The method of claim 1, wherein the user interaction data comprises  
9 network engineering data.

10

11 17. The method of claim 1, wherein the user interaction data comprises  
12 user profile data.

13

14 18. The method of claim 1, wherein the user interaction data comprises  
15 one or more of network engineering data and user profile data.

16

17 19. The method of claim 1, further comprising:  
18 programming the probe element with the functional definition.

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20 20. The method of claim 19, wherein the programming of the probe  
21 element is provided by the communication network.

22

23 21. The method of claim 20, wherein the programming is provided by the  
24 communication network via the communication link and is capable of being  
25 dynamically changed by the communication network.

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27 22. The method of claim 21, wherein the programming of the probe  
28 element is dynamically changed by the communication network via the  
29 communication link in response to the user interaction data.

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23. The method of claim 1, wherein the plurality of transactions comprise one or more of voice communications and data communications between the user of the communication device and the communication network.

24. The method of claim 1, further comprising:  
performing one or more diagnostic tests of the communication network in a diagnostic mode of operation in accordance with a diagnostic criterion downloaded to the communication device from the communication network via the communication link in response to the communication network identifying one or more network performance problems from the user interaction data.

25. The method of claim 1, further comprising:  
transmitting the generated user interaction data from the communication device to a collection communication device of the communication network.

26. The method of claim 1, further comprising:  
receiving multiple user interaction data from one or more additional communication devices in the communication network;  
aggregating the multiple user interaction data to generate aggregate user interaction data; and  
transmitting the aggregate user interaction data to the communication network via the communication link.

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1 27. The method of claim 1, further comprising:  
 2 transmitting the user interaction data to the communication network in  
 3 response to at least one of the functional definition of the probe element and a  
 4 request from the communication network; and  
 5 analyzing the user interaction data to identify one or more network  
 6 performance problems of the communication network.

7  
 8 28. The method of claim 27, further comprising:  
 9 implementing changes to operation of the communication network to  
 10 counter the one or more identified network performance problems and  
 11 improve communications in the communication network from the perspective  
 12 of the user of the communication device.

13  
 14 29. The method of claim 27, further comprising:  
 15 generating one or more network performance problem reports  
 16 comprising the one or more network performance problems identified.

17  
 18 30. The method of claim 27, further comprising:  
 19 the communication device performing one or more diagnostic tests of  
 20 the communication network in a diagnostic mode of operation in accordance  
 21 with a diagnostic criterion downloaded to the communication device from the  
 22 communication network via the communication link in response to the one or  
 23 more network performance problems identified during analysis of the user  
 24 interaction data.

25  
 26 31. The method of claim 27, wherein transmitting the user interaction data  
 27 to the communication network comprises:  
 28 transmitting the user interaction data to a collection communication  
 29 device of the plurality of communication devices which transits the user

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1 interaction data to a server of a network operator of the communication  
2 network.

3

4 32. The method of claim 27, wherein transmitting the user interaction data  
5 to the communication network comprises:

6 receiving multiple user interaction data from other communication  
7 devices of the plurality of communication devices in the communication  
8 network;

9 aggregating the multiple user interaction data with the user interaction  
10 data generated by the communication devices to generate aggregate user  
11 interaction data; and

12 transmitting the aggregate user interaction data to the communication  
13 network via the communication link.

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2 33. A method for improving communications of a communication network  
3 having a plurality of communication devices by which a plurality of  
4 corresponding user communicate in the communications network, said  
5 method comprising:

6 for each communication device of the plurality of communication  
7 devices:

8 monitoring a plurality of transactions occurring between a user  
9 of a communication device operating in a communication network and  
10 the communication network in accordance with a functional definition of  
11 a probe element of the communication device, wherein the plurality of  
12 transactions are at least a portion of the user's interaction with the  
13 communication network via the communication device and wherein the  
14 functional definition of the probe element is operable to be dynamically  
15 and remotely configured by the communication network via a  
16 communication link between the communication device and the  
17 communication network;

18 capturing the plurality of transactions in accordance with the  
19 functional definition of the probe element;

20 measuring one or more characteristics of the plurality of  
21 transactions to generate user interaction data in accordance with the  
22 functional definition of the probe element;

23 transmitting the user interaction data to the communication  
24 network in response to at least one of the functional definition of the  
25 probe element and a request from the communication network;

26

27 the communication network aggregating the user interaction data  
28 received from one or more communication devices of the plurality of  
29 communication devices to generate statistical information about the

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1 communication network; and

2 the communication network analyzing the statistic information to  
3 identify one or more network performance problems of the communication  
4 network.

5

6 34. The method of claim 33, further comprising prior to said monitoring:

7 downloading the probe element to the communication device from the  
8 communication network via the communication link.

9

10 35. The method of claim 33, further comprising after said analyzing:

11 implementing changes to operation of the communication network to  
12 counter the one or more identified network performance problems and  
13 improve communications in the communication network from the perspective  
14 of one or more of the user of the one or more communication devices.

15

16 36. The method of claim 33, further comprising after said analyzing:

17 generating one or more network performance problem reports  
18 comprising the one or more network performance problems identified.

19

20 37. The method of claim 33, further comprising prior to said monitoring:

21 defining the functional definition of the probe element in accordance  
22 with the type of user interaction data desired to be generated for the  
23 communication device.

24

25 38. The method of claim 37, further comprising:

26 downloading the probe element to the communication device from the  
27 communication network via the communication link.

28

29 39. The method of claim 33, wherein the communication device operates in

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1 a non-interactive mode of operation in which the user interaction data is  
2 generated in a manner that is transparent to the user of the communication  
3 device.

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5 40. The method of claim 33, further comprising:

6 a network operator of the communication network dynamically  
7 controlling operation of the one or more communication devices in a  
8 diagnostic mode of operation in accordance with a diagnostic criterion.

9

10 41. The method of claim 40, further comprising:

11 the network operator controlling the one or more communication  
12 devices to perform diagnostic tests of the one or more network performance  
13 problems capable of being monitored by the one or more communication  
14 devices in accordance with the diagnostic criterion.

15

16 42. The method of claim 40, further comprising:

17 when not in the diagnostic mode of operation the one or more  
18 communication devices operating in a non-interactive mode of operation  
19 during which the plurality of transactions are monitored and captured and the  
20 user interaction data is generated in a manner that is transparent to the users  
21 of the one or more communication devices.

22

23 43. The method of claim 40, further comprising:

24 when not in the diagnostic mode of operation the one or more  
25 communication devices operating in a quasi-interactive mode of operation  
26 during which the plurality of transactions are monitored and captured and the  
27 one or more characteristics of the plurality of transactions are monitored by  
28 the probe element to generate the user interaction data and during which  
29 users of the one or more communication devices can decide when to report to

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1 the network operator one or more network performance problems identified in  
2 the user interaction data.

3

4 44. The method of claim 40, further comprising:

5 the users of the one or more communication devices granting  
6 permission to the network operator to control the communication device to  
7 perform diagnostic tests while in the diagnostic mode of operation.

8

9 45. The method of claim 40, further comprising:

10 downloading the diagnostic criterion from the communication network  
11 to the probe element via the communication link.

12

13 46. The method of claim 45, wherein the communication link comprises the  
14 Internet.

15

16 47. The method of claim 33, further comprising:

17 the one or more communication devices operating in a quasi-  
18 interactive mode of operation during which the plurality of transactions are  
19 monitored and captured and the one or more characteristics of the plurality of  
20 transactions are measured by the probe element to generate the user  
21 interaction data and during which users of the one or more communication  
22 devices can decide when to report to the network operator one or more  
23 network performance problems identified in the user interaction data.

24

25 48. The method of claim 47, further comprising:

26 the users of the one or more communication devices previously  
27 deciding that the one or more communication devices will operation in the  
28 quasi-interactive mode of operation.

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1 49. The method of claim 33, wherein the user interaction data comprises  
2 network engineering data.

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4 50. The method of claim 33, wherein the user interaction data comprises  
5 user profile data.

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7 51. The method of claim 33, wherein the user interaction data comprises  
8 one or more of network engineering data and user profile data.

9

10 52. The method of claim 33, further comprising:  
11 programming the probe element with the functional definition.

12

13 53. The method of claim 52, wherein the programming of the probe  
14 element is provided by the communication network.

15

16 54. The method of claim 53, wherein the programming is provided by the  
17 communication network via the communication link and is capable of being  
18 dynamically changed by the communication network.

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20 55. The method of claim 54, further comprising:  
21 the communication network dynamically removing the probe element  
22 via the communication link.

23

24 56. The method of claim 54, wherein the programming of the probe  
25 element is dynamically changed by the communication network via the  
26 communication link in response to the user interaction data.

27

28 57. The method of claim 33, wherein the plurality of transactions comprise  
29 one or more of voice communications and data communications between the

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1 user of the communication device and the communication network.

2

3 58. The method of claim 33, wherein each communication device transmits  
4 the user interaction data to a server of the communication network.

5

6 59. The method of claim 33, wherein analyzing the user interaction data is  
7 performed by a network operator of the communication network.

8

9 60. The method of claim 33, wherein aggregating the user interaction data  
10 received from the one or more communication devices comprises mapping  
11 the user interaction data to corresponding geographic locations occurring  
12 within the communication network to generate the geo-centric statistical  
13 information associated with the geographic locations.

14

15 61. The method of claim 33, further comprising:

16 the one or more communication devices performing one or more  
17 diagnostic tests of the communication network in a diagnostic mode of  
18 operation in accordance with a diagnostic criterion downloaded to the one or  
19 more communication devices from the communication network via the  
20 communication link in response to the one or more network performance  
21 problems identified during analysis of the user interaction data.

22

23 62. The method of claim 33, wherein transmitting the user interaction data  
24 to the communication network comprises:

25 transmitting the user interaction data to a collection communication  
26 device of the plurality of communication devices that transmits the user  
27 interaction data to a server of a network operator of the communication  
28 network.

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1 63. The method of claim 33, wherein transmitting the user interaction data  
2 to the communication network comprises:

3 receiving multiple user interaction data from other communication  
4 devices of the plurality of communication devices in the communication  
5 network;

6 aggregating the multiple user interaction data with the user interaction  
7 data generated by the communication devices to generate aggregate user  
8 interaction data; and

9 transmitting the aggregate user interaction data to the communication  
10 network via the communication link.

11

12 64. The method of claim 33, further comprising:

13 a network operator of the communication network broadcasting a group  
14 functional definition to a group of communication devices of the plurality of  
15 communication devices, wherein said group functional definition overrides the  
16 functional definition of each communication device of the group.

17

18 65. The method of claim 64, wherein a collector communication device of  
19 the group receives the group functional definition and distributes the group  
20 functional definition to other communication devices of the group.

21

22 66. The method of claim 64, wherein the group functional definition  
23 comprises a group diagnostic criterion that causes the group of  
24 communication devices to operate in a diagnostic mode of operation in  
25 accordance with the group diagnostic criterion.

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